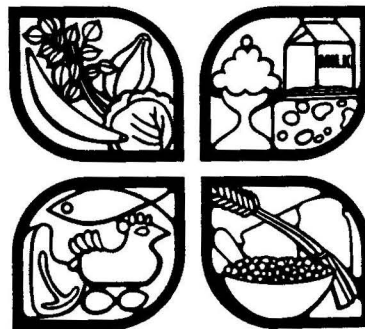


HAWAII COOPERATIVE EXTENSION SERVICE

Hawaii Institute of Tropical Agriculture and Human Resources
University of Hawaii at Manoa

COMMODITY FACT SHEET AVO-3(A)

FRUIT



AVOCADO

C. L. Chia, Extension Specialist, Horticulture

D. O. Evans, Research Associate, Horticulture

Family: Lauraceae

Scientific Name: *Persea americana* Mill.

Origin: American tropics

Description

Avocado is a much-branched evergreen tree 40 to 80 feet in height with elliptic leaves 3 to 10 inches long. Flowers are small, greenish, and perfect (having both male and female parts). Fruits are round, pear shaped (pyriform), or oblong, with skin varying from pliable to woody, smooth to rough and pebbly, and green, yellow, reddish purple, purple, or black in color. The flesh is greenish yellow to bright yellow when ripe, with a buttery consistency. Fruits have a single large seed making up 10 to 25 percent of the fruit weight.

Varieties

Avocado trees vary in size and adaptability to climate and soil type. They also vary in length of time from flowering to fruit maturity and, therefore, in season of maturity. Fruits of avocado varieties, or cultivars, vary widely in moisture and oil content, from less than 5 percent oil (with a watery texture) to more than 30 percent oil. Flesh texture should be smooth, but inferior varieties often have fibrous strings embedded in the flesh. Fruit weight ranges from about 1/4 lb to more than 3 lb. Three horticultural races are recognized: Guatemalan, West Indian, and Mexican. Many cultivars are hybrids between races and are not readily identifiable by race. Most cultivars grown in Hawaii are of the Guatemalan race, or are hybrids between the Guatemalan and West Indian races.

Propagation

Seedling plants fail to reproduce true to type, and grafting is necessary to maintain desired growth, bearing, and fruit characteristics. Grafted trees usually begin to bear fruit three to four years after transplanting. To avoid *Phytophthora* root rot contamination in the nursery when growing seedling rootstocks for grafting, (1) do not use seed from windfall fruits

picked from the ground, (2) propagate seedling rootstocks in sterilized, disease-free media, and (3) do not allow containers to contact soil. Purchase only plants that have been grown with these standards of sanitation.

Soil Types

Avocado trees grow well on many soil types provided the soil is well drained. Planting sites should not have low areas where water stands after heavy rains. Poor soil drainage and soil pH less than 6.2 (acid soil reaction) favor development of *Phytophthora* root rot.

Location

Avocado trees are sensitive to sodium chloride and therefore are not suited to shoreline planting. Areas exposed to high winds should be avoided because branches are easily broken, and flowers and fruits may be damaged. Relative humidity of 50 percent or more is desirable during flowering and fruit set, so production in dry areas may be low.

There is a great deal of variation among hybrid cultivars in adaptation to different elevations and temperatures. In Hawaii, Guatemalan and Mexican races and their hybrids tolerate cool upland conditions and can be grown up to elevations of approximately 2000 to 2500 feet. Varieties of pure Mexican parentage, rarely grown in Hawaii, can be grown up to the frost line. The thin-skinned West Indian varieties, locally known as "summer pears," usually produce fruit of marginal quality when grown above 1000 feet.

Cultural Practices

Trees should be spaced 25 to 30 feet apart. Cultivation for weed control should be avoided by using herbicides; if practiced, cultivation should be as shallow as possible to avoid damage to the shallow avocado root system. Organic mulches are recommended for weed control and maintenance of good soil condition. Pruning trees is usually unnecessary except to shape

young trees and remove dead branches. Heavily laden fruiting branches may be propped with poles.

Important plant nutrients applied as fertilizer¹ to avocado are nitrogen (N) and calcium (Ca). Among the micronutrients, zinc (Zn) is important to avocado and should be applied whenever deficiency is indicated.² If soil is strongly acidic, add calcium carbonate to raise pH to 6.2. If soil pH is adequate (pH 6.2 to 6.5), use calcium nitrate to provide calcium without increasing pH.

Pollination

Pollination is principally by bees. Two avocado flowering types, A and B, are distinguished by what time of day the flowers open. Each flower opens twice and is functionally female (pollen receptive) at first opening and functionally male (pollen shedding) at second opening. Type A opens first in the morning, closes about midday, and reopens in the afternoon of the following day. Type B opens first in the afternoon, closes in the evening, and reopens the following morning. Having trees of both types is important in orchards because production is improved by adequate cross-pollination (see Table 1). This is not as important in residential areas, however, where both tree types are usually present. Avocado trees flower during late winter and early spring in Hawaii. After fruit is set, some premature fruit drop is common and can be expected.

Table 1. Avocado varieties recommended for home garden plantings in Hawaii

Season of bearing	Flowering type	
	A	B
Fall & winter	San Miguel Semil-34	Case Kahaluu
Winter & spring	Greengold Hayes	Nishikawa Sharwil
Spring & summer	Ohata	Chang Murashige

Source: HITAHR Brief 052, "Recommended Fruits and Nuts for the Home Garden."

¹See General Home Garden Series No. 37, "Fertilizers for Fruit Trees in the Home Garden," and Circular No. 487, "How to Fertilize Trees and Shrubs."

²See General Home Garden Series No. 24, "Foliar Application of Fertilizers."

Harvesting

Fruits are picked when mature but still hard and then allowed to ripen. Mature fruits are full sized, may change color slightly or lose glossiness, and have brown seed coats. Determining maturity may be difficult and usually requires experience. Fruit should be harvested from the tree with pruning shears or special clippers and never pulled from the branch. The pedicel (fruit stem) should remain attached to the fruit. When the stem is pulled out, the fruit often spoils. Fruits are easily bruised, and windfall fruits are not marketable.

Postharvest

Fruit ripens only after falling or being picked. Ripeness is indicated by softening of the fruit. Fruit picked too early tends to shrivel and may fail to ripen. Determining the ripeness of thick-skinned varieties by feeling for softness may be difficult and requires some experience. Sometimes the pedicel is removed and a toothpick inserted to test fruit softness, but this method may permit entry of disease organisms. Fruit of some cultivars may be refrigerated without damage for several days after ripening.

Diseases of Avocado

Dodder (*Cuscuta sandwichiana*)
 Avocado root rot (*Phytophthora cinnamomi*)
 Stem-end rot (*Phomopsis* sp., *Dothiorella* sp.)
 Fruit rot (*Dothiorella* sp.)
 Anthracnose (*Colletotrichum gloeosporioides*)
 Leaf tip-burn (various causes, not all disease related, including salt accumulation from overfertilizing)
 Algal leaf spot (*Cephaleuros virescens*)
 Scab (cause unknown; resistant varieties are available)

Insect Pests of Avocado

Red-banded thrips (*Selenothrips rubrocinctus*)
 Armored scales (several species)
 Chinese rose beetle (*Adoretus sinicus*)
 Fruit fly
 Mites
 Black twigborer (*Xylosandrus compactus*)
 Mealybug (*Dysmicoccus neobrevipes*, *Nipaecoccus nipae*)
 Plantbugs (*Hyalopeplus pellucidus* and other species)

The authors would like to thank Drs. R. A. Hamilton, R. F. L. Mau, H. Y. Nakasone, W. Nishijima, and E. Trujillo for their comments and suggestions on the manuscript.